Conditional and Pattern-Oriented Robustness

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The communication deals with the problem of robustness, as defined in filtering applications, and introduces two definitions of robustness related to applications oriented to pattern recognition.

In the first definition, it is assumed an application is defined from the set of "signals" to a set on "patterns", and a distance is given on the last set. Then, the robust filtering realizes the min max of the distance between the obtained and the true pattern.

In the second definition, the conditional probability the signal corresponds to a pattern is used.

Some basical properties of the above defined robustness are also given.

2.7. *Gaussian processes and related topics*

Spectral Conditions for Local Nondeterminism

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Let $X(t)$ be a real Gaussian process with stationary increments and spectral distribution function $F(x)$. Put $\phi(t)=F(\infty)-F(1/t)$, $t>0$. Sufficient conditions in terms of F are given for the process to be locally ϕ-nondeterministic. These are formulated for discrete and absolutely continuous functions F. The results in the discrete case are applied to the analysis of the local time of a random Fourier series with i.i.d. coefficients. The class of distributions of the coefficients includes not only the normal distribution but others such as the symmetric stable distribution.

Some Theorems of Central Limit Type for Markov Paths and some Properties of Gaussian Random Fields

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Our primary aim is to "build" versions of generalized Gaussian processes from simple, elementary components in such a way that as many as possible of the esoteric properties of these elusive objects become intuitive. For generalized Gaussian processes, or fields, indexed by smooth functions or measures of $\mathbb{R}^d$, our building blocks will be simple Markov processes whose state space is $\mathbb{R}^d$. Roughly speaking, by summing functions of the local times of the Markov processes we shall, via a central limit theorem type of result, obtain the Gaussian field.

This central limit result, together with related results indicating how additive functionals of the Markov processes generate additive functionals of the fields, and, indeed, how the entire Fock space or Wiener chaos structure of the L^2 space of a Gaussian field can be identified with additive functionals of Markov processes, yield considerable insight into properties of generalized Gaussian processes such as Markovianess, self-similarity, "locality" or functionals, etc.

RKHS for Gaussian Measures on Metric Vector Spaces

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The RKHS for Gaussian measures on complete separable metric vector spaces which are not necessarily locally convex are constructed.

Let (X, B, μ) denote a complete separable metric vector space with the Borel σ-algebra B completed in a symmetric Gaussian measure μ. Let $(R, B(R))$ denote the real line and $B(R)$ its Borel σ-algebra. A measurable map F from (X, B) into $(R, B(R))$ is called a quasi-additive measurable functional (q.m.f.) if

$$F(x+y) = F(x) + F(y) \quad \mu \times \mu \text{ a.e.},$$

$$F(-x) = -F(x) \quad \mu \text{ a.e.}$$

Let X_μ^* (the space of all q.m.f.) generate B (mod μ) then the RKHS of the measure μ coincides with the set of all admissible translates of the measure μ.

Important examples of spaces of this kind which are not locally convex vector spaces are: the space $L_0 = L_0[0, 1]$ of all measurable functions defined on the unit interval with convergence in measure or more generally some Orlicz spaces L_ϕ.

As an application of our result we obtain that every Gaussian measure defined on a separable, complete metric vector space such that there are sufficiently many measurable linear functionals is an extension of the canonical cylindrical Gaussian measure on the RKHS.

Von Mises Statistics for Strongly Dependent Random Variables

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Let $(X_i)_{i=1}^{\infty}$ be a stationary, mean-zero Gaussian process with covariances $f(k) = EX_{k+1}X_1$ satisfying $r(0) = 1$ and $r(k) = k^{-D}L(k)$ where D is small. Consider the two-parameter empirical process, for $G(X_i)$,

$$\left\{ F_N(x, t) = \frac{1}{N} \sum_{i=1}^{[Nt]} 1\{G(X_i) \leq x\};\ -\infty < x < +\infty,\ 0 \leq t \leq 1 \right\}$$

where G is any measurable function. Non-central limit theorems are obtained for $F_N(x, t)$ and they are used to derive the asymptotic behavior of suitably normalized